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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,056	04/16/2004	M. Saif Islam	200312090-1	9464
22879	7590	10/18/2005	EXAMINER	
HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			PHAM, THANHHA S	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/826,056

Applicant(s)

ISLAM ET AL.

Examiner

Thanhha Pham

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 August 2005.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9, 12-21, 24 and 43-57 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☒ Claim(s) 1-7 and 12 is/are allowed.  
6) ☐ Claim(s) 8, 9, 13-21, 24 and 43-57 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 08/10/2005.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☒ Other: Attachment.

## DETAILED ACTION

This Office Action is in response to Applicant's Amendment dated 08/10/2005.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claims 8-9, 13-21, 24 and 43-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

► With respect to claim 8,

lines 4-8, "nano-scale thick layers of a first material alternating with a layer of the vertical structure material in the trench, the first material being different from the semiconductor substrate material and the vertical structure material, one of the first material layers being adjacent to the substrate" renders the claim indefinite. It is not clear how nano-scale thick layers of a first material can be alternated with a layer of the vertical structure material in the trench. In addition, "the substrate" (line 8) lacking antecedent basis should be changed to "the semiconductor substrate" to be consistent with the claimed language to clarify scope of the claim.

► With respect to claim 13,

lines 7-15, "a plurality of nano-scale spaced vertical structure disposed in the trench and spaced from the trench sidewalls, a vertical structure of the

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plurality having opposing sides and an end, a side of the vertical structure facing one of a side of an adjacent vertical structure and a trench sidewall, the end having a horizontal surface coplanar with the (110) planar surface of the semiconductor substrate, a material of the plurality of vertical structures being different from a material of the semiconductor substrate, wherein the plurality of vertical structures between the trench sidewalls provides a nano-scale patterned for nano-imprinting” renders the claim indefinite. It is not clear that “a vertical structure of the plurality” is a vertical structure of which plurality – the plurality of (111) vertical lattice planes (lines 2-3) or the plurality of nano-scale spaced vertical structures (line 7). Examiner suggests “the plurality of the nano-scale spaced vertical structures” should be used consistently in claim 13 and all of dependent claims depending on claim 13 to clarify scope of claims. In addition, claimed language of “trench sidewalls” should be consistently used in claim 13 and of dependent claims depending on claim 13 to clarify scope of claims.

► With respect to claim 19,

line 2, “the vertical structures” lacking antecedent basis should be changed to “the nano-scale spaced vertical structure” to clarify scope of the claim.

► With respect to claim 20,

lines 4-6, “the vertical structure material” should be changed to “the nano-scale spaced vertical structure” to clarify scope of the claim (see lines 7-8 of

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claim 13, nano-scale spaced vertical structures 308 of figure 3E and specification 17 lines 15-28 for details).

- ▶ With respect to claims 21 and 46-47,

“the vertical structure material” should be changed to “the nano-scale spaced vertical structure material” to clarify scope of claim (see lines 7-8 of claim 13, nano-scale spaced vertical structures 308 of figure 3E and specification 17 lines 15-28 for details).

- ▶ With respect to claim 50,

lines 3, 5 and 8-9, “the sidewalls” lacking antecedent basis should be changed to “the vertical sidewalls” to clarify scope of claim.

- ▶ With respect to claim 51,

line 4, “the substrate material” should be changed to “the semiconductor substrate material” to clarify scope of claim.

line 6, “each sidewall of the trench” should be changed to “each vertical sidewall of the trench” to clarify scope of claim.

lines 6-7, “an adjacent vertical structure of the plurality” should be changed to “an adjacent vertical structure of the plurality of the vertical structure” to clarify scope of claim (see line 5 of claim 50 for details).

line 7, “the sidewalls” should be changed to “the vertical sidewalls of the trench” to clarify scope of claim.

- ▶ With respect to claim 52,

line 4-5, "the substrate material" should be changed to "the semiconductor substrate material" to clarify scope of claim.

line 5, "the substrate" should be changed to "the semiconductor substrate" to clarify scope of claim.

► With respect to claim 53,

line 5, "each sidewall" should be changed to "each vertical sidewall of the trench" to clarify scope of claim (see line 2 of claim 50 for details).

line 5, "a vertical structure of the plurality" should be changed to "a vertical structure of the plurality of the vertical structures" to clarify scope of claim.

lines 5-6, "the sidewall" should be changed to "the vertical sidewall of the trench" to clarify scope of claim.

► With respect to claim 54,

lines 3 & 5, "the sidewalls" lacking antecedent basis should be changed to "the vertical sidewalls" to clarify scope of claim.

► With respect to claim 55,

lines 1-2, "one of the first materials" should be changed to "one layer of the first material" to clarify scope of claim (see line 7 of claim 54 for details).

line 4, "the sidewall" should be changed to "the vertical sidewall" to clarify scope of claim.

line 5, "the sidewall" should be changed to "the sidewalls of the trench" to clarify scope of claim.

**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 54, 55 and 57, as being best understood, are rejected under 35 U.S.C. 102(e) as being anticipated by or, in alternative, under 35 U.S.C. 103(a) as obvious over Chou et al [US 2004/0156108].**

*\*\*\*Notice: It is noted that process limitations of detail of polished characteristic in claims 54 does not carry weight in a claim drawn to structure because distinct structure is not necessarily produced. See In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985). In addition, a "product by process" limitation is directed to the product per se, no matter how actually made, in re Hirao, 190 USPQ 15 and 17 (footnote 3). See also In re Brown, 173 USPQ 685 (CCPA 1972); In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324 (CCPA 1974); In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90; and In re Marosi et al., 218 USPQ 289 (Fed. Cir. 1983); all of which made clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product by a new method is not patentable as a product, whether claimed in "product by process" claims or not. "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). In addition, this rejection based on a scope of claims that a material of semiconductor layer, a first material and a second material are the same material since independent claim 54 does not cite a difference between the first material, the second material and the semiconductor material.*

Chou et al (figs 13-17's, text [0001]-[0099]) discloses the claimed imprinting apparatus comprising: a semiconductor substrate (NIL mold 20A, fig 13C or 15, text paragraph [0074]) having a (110) direction planar surface, the semiconductor substrate having a trench (see fig 15 as attachment: trench defined by the vertical sidewalls noticed in figure) with vertical sidewalls, the vertical sidewalls being aligned with (111) vertical lattice planes of the semiconductor substrate; a plurality of vertical structures

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disposed in the trench between the vertical sidewalls (see fig 15 as attachment); and alternating layers of a first material and a second material in the trench, the second material layers having portions that extend vertically, the vertically extending portions being the plurality of the vertical structures, wherein the vertical structures are spaced apart from each other and from the vertical sidewalls of the trench to form a mold that provide a pattern for imprinting, wherein one layer of the first material is adjacent to the semiconductor substrate in trench, a thickness of the first material layer defines spaces between the vertical structures and further defines spaces between the vertical sidewall of the trench and a vertical structure of the plurality of the vertical structure that is adjacent to the vertical sidewall of the trench, wherein the alternating layers define an internal depth of the imprinting apparatus (see fig 15 as attachment for details).

***Allowable Subject Matter***

3. Claims 1-7 and 12 are allowed.
4. The following is a statement of reasons for the indication of allowable subject matter: Recorded Prior Art fails to disclose or suggest combination structure of imprinting apparatus as cited in claim 1 including the trench vertical sidewalls aligned with (111) vertical lattice planes of the semiconductor substrate, a plurality of vertical structures disposed in the trench between the trench vertical sidewalls, a material of the vertical structures being different from a material of the semiconductor substrate wherein the plurality of the vertical structures being spaced apart from each other and from the trench vertical sidewalls to form a mold that provides a pattern for imprinting.



***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thanhha Pham

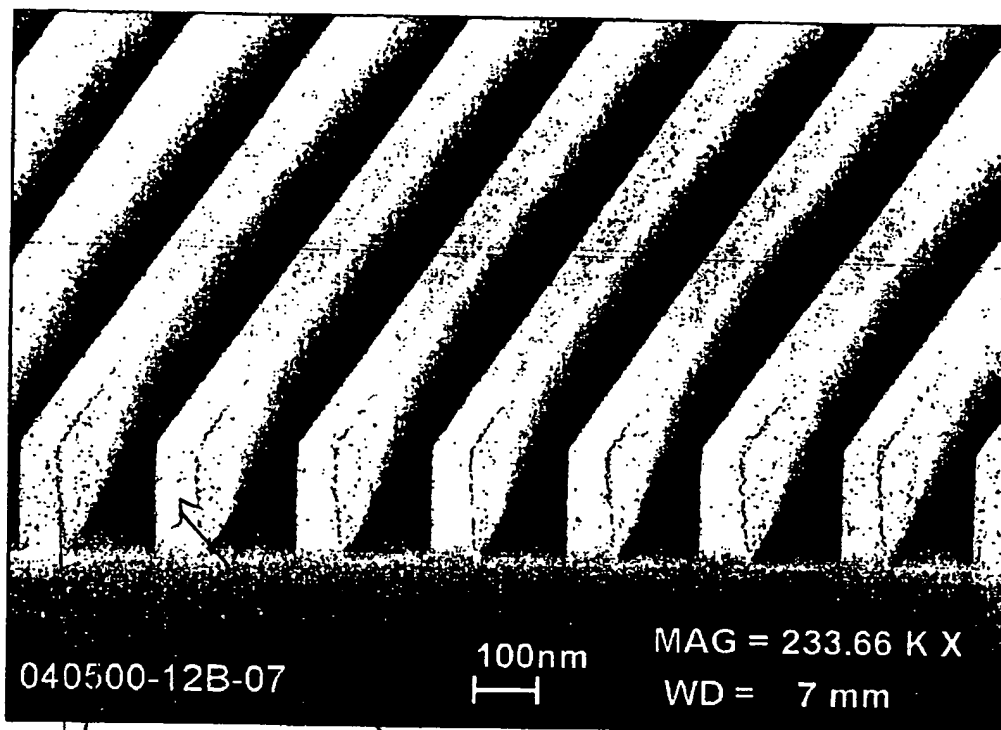
A handwritten signature in black ink, reading "Carl Whitehead, Jr." with a stylized flourish at the end.

**CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800**

# ATTACHMENT

Patent Application Publication Aug. 12, 2004 Sheet 15 of 21

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French  
**Fig. 15**

layer of first material

layer of 2nd material

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